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Announcement of Opportunity

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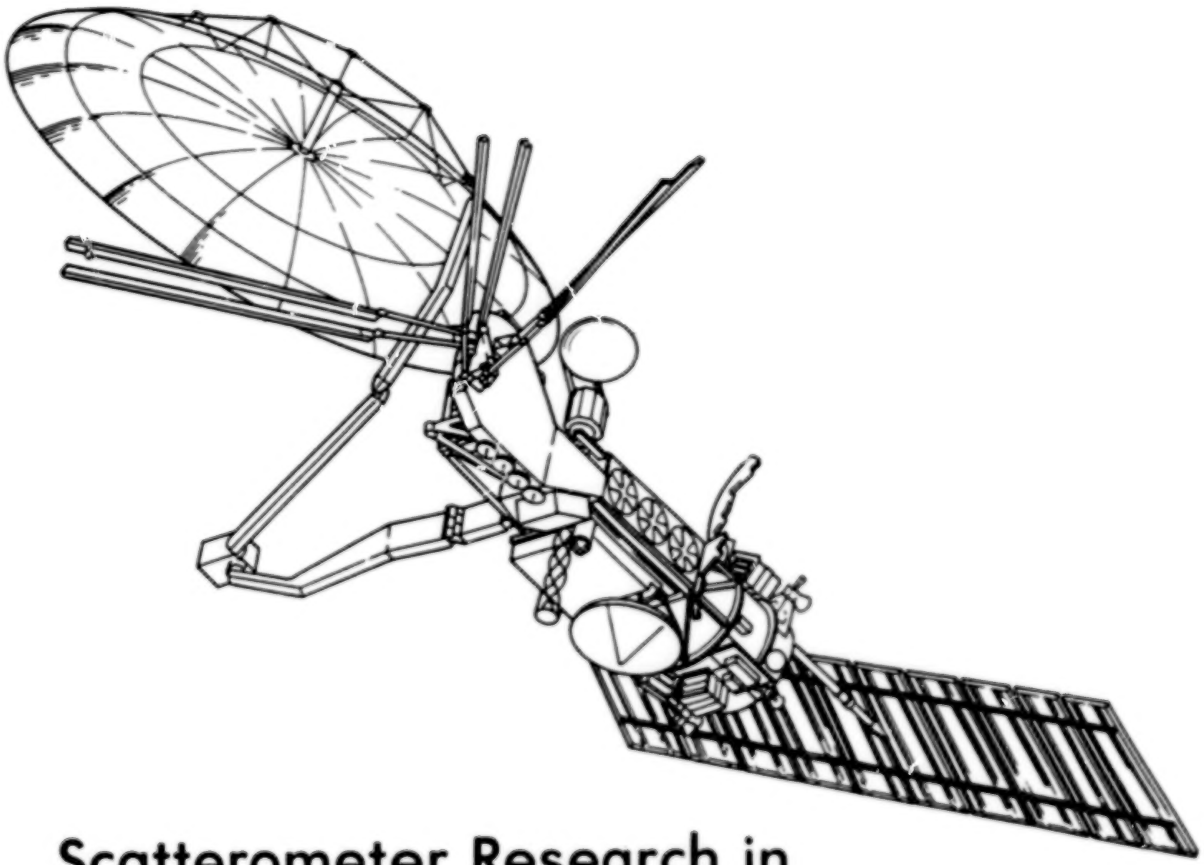

Scatterometer Research in Oceanography and Meteorology

- Letters of Intent-March 15, 1985
- Proposals Due-May 15, 1985

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I. DESCRIPTION OF THE OPPORTUNITY

The National Aeronautics and Space Administration (NASA) announces the opportunity to conduct scientific studies in oceanography and meteorology utilizing the data from the NASA Scatterometer (NSCAT). NSCAT will fly aboard the U.S. Navy's Remote Ocean Sensing System (N-ROSS) satellite (see cover) currently scheduled for launch in mid-1989. The expected duration of the NSCAT/N-ROSS mission is three years. The NSCAT is an active microwave instrument designed to measure wind speed and direction near the sea surface. NSCAT will provide frequent, accurate, high-resolution vector wind measurements over the global oceans; observations needed to advance our understanding of the ocean's response to surface wind forcing; and physical processes governing atmospheric motions in the lower troposphere. Section IV of this document provides a more detailed description of the NSCAT and its capabilities, as well as plans for the NSCAT ground-based data processing and distribution system. The overall NSCAT project is being managed for NASA by the Jet Propulsion Laboratory (JPL).

Through this Announcement, NASA is soliciting proposals for oceanographic and meteorological investigations utilizing scatterometry data from NSCAT. Research proposals should be aimed at improving our understanding of near-surface atmospheric motions and/or the physical processes occurring in the upper ocean resulting from surface wind forcing. While proposals may involve evaluation of sensor performance, or the interpretation of NSCAT measurements in terms of basic geophysical quantities, primary emphasis should be on oceanographic/meteorological scientific investigations.

Two types of proposals will be considered: (1) those requesting NASA funds to support the analysis and interpretation of NSCAT data, and (2) those that require NSCAT data but do not require financial support by NASA. The latter type of proposal may be submitted by foreign (non-US) research institutions, by private organizations, or by other institutions which could potentially benefit from participating in this type of data analysis activity.

Although the flight of NSCAT is not scheduled to begin until mid-1989, NASA is issuing this Announcement now to ensure maximum scientific participation in the implementation of the NSCAT mission, thereby optimizing the scientific utility and credibility of the data. Principal Investigators selected in response to this Announcement will be responsible for the definition, planning, and implementation of their own individual oceanographic and/or meteorological studies utilizing NSCAT data. These investigators will also be members of the NSCAT Science Working Team (NSCAT SWT).

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The NSCAT SWT will be headed by the NSCAT Project Scientist (see Appendix C), who is currently Dr. Michael Freilich of the Jet Propulsion Laboratory. In addition to conducting their individual research investigations, members of the SWT will work with NASA to assist and guide the Project in detailed planning and design of the NSCAT system, addressing issues such as:

- The scientific impact of possible changes in the baseline NSCAT flight instrument design (Section IV);
- The precise form of the empirical geophysical model function used to relate backscatter to wind velocity;
- The retrieval algorithm used to calculate vector winds from NSCAT measurements of backscatter;
- The precise form and scientific utility of the high-level gridded/averaged wind field maps to be produced by the NSCAT data processing system;
- The design of NSCAT validation activities (see Science Opportunities Document cited in Section VII for an expanded discussion).

While proposals submitted in response to this Announcement need not specifically address these issues, potential Principal Investigators should be aware that they will have the responsibility to advise the Project in these and similar areas in the pre-launch years. Subcommittees may be established to formally (through reports) address concerns and issues raised by the Project and/or the SWT or members thereof. Exchanges of study results between the Project and the SWT are crucial to achieving NASA's objectives of optimizing the scientific utility of the NSCAT data and demonstrating such utility to the oceanographic and meteorological research communities. Investigators chosen in response to this Announcement will be expected to participate fully and energetically in pursuing these objectives.

The NSCAT SWT will formally meet approximately three times per year. These meetings will include routine briefings of the SWT regarding Project plans and concerns, and similar exchanges of research plans between the SWT and the Project. In addition, the NSCAT SWT meetings will provide a forum for discussions of data analysis techniques and approaches among investigators with diverse disciplinary backgrounds.

NSCAT is an approved flight project that was formally initiated in FY-85. Funding for the NSCAT project includes implementation and operation of the flight instrument and the ground-based data processing and distribution system, as well as the conduct of the science investigations solicited by this Announcement. The research programs proposed in response to this Announcement will

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be initiated in FY 86 and are planned to be continued through FY 92. A minimum of 8 million dollars will be available to conduct these seven-year research programs. Science activities will be conducted in two phases. During Phase 1, in FY 86 through FY 88, funding will be limited and activities will concentrate on refining the scientific investigations that will utilize the NSCAT data, advising the NSCAT project, and developing data analysis techniques. It is expected that the major costs of investigations will be incurred in Phase II, years FY 89 through FY 92, for the actual analysis of NSCAT data. Depending upon the scope and complexity of individual investigations, it is anticipated that 10-20 proposals will be approved. Proposals must designate a single Principal Investigator (PI) who will be held fully responsible for implementation of the proposed efforts including: the quality of the scientific investigation and the dissemination of results, all necessary developments, and timely delivery of required documentation and equipment within budget limitations (see Appendix C). Investigations that require more than one investigator, may also include Co-Investigators (Co-I's). Each Co-I must have clearly defined responsibilities involving definition and conduct of the scientific investigations which are explicitly justified in the proposal. The results of approved investigations are to be published in the refereed scientific literature.

Readers of this Announcement should realize that they do not need to submit a proposal to NASA now to gain access to the NSCAT data that will be collected. To accommodate those scientists who do not wish to participate in the NSCAT pre-launch SWT activities, but whose intent is simply the post-launch utilization of these data, NASA expects to release, before the launch of N-ROSS, a future solicitation to conduct NASA supported research with the NSCAT data. There is no planned period of NSCAT data exclusivity or priority for members of the SWT. NSCAT data will be made available to the general public from the National Oceanic and Atmospheric Administration/National Environmental Satellite Data and Information Service (NOAA/NESDIS).

II. ANNOUNCEMENT OBJECTIVES

To be considered, proposals submitted in response to this Announcement must identify a topical problem in oceanography and/or meteorology that can be addressed in an innovative fashion employing the NSCAT data set. The objectives of this Announcement are to develop improved understanding of near-surface winds and the ocean's response to surface wind forcing through the analysis and interpretation of NSCAT data. In all cases, proposed investigations must make use of the unique accuracy, coverage, and/or resolution of the NSCAT data. It is anticipated that successful proposals will address a set of scientific problems of the following nature:

- To conduct modeling-based studies of local, regional, and basin-wide ocean response to wind forcing.

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- To conduct innovative studies of atmospheric circulation and/or meteorological phenomena over the length and time scales resolved by NSCAT measurements.

- To conduct studies of exchanges of heat, momentum, and water vapor between the oceans and the atmosphere on a variety of scales.

- To develop techniques for the assimilation of NSCAT wind data into atmospheric and/or oceanographic numerical models.

- To develop techniques for combining NSCAT wind measurements with other in situ and remotely sensed data with the aim of constructing accurate maps of atmospheric forcing functions for use by oceanographic and meteorological modelers.

This list of problems is intended to be representative and is neither exclusive nor exhaustive. An extensive survey of possible oceanographic and meteorological studies utilizing NSCAT wind measurements is presented in the NSCAT Science Opportunities Document (see Section VII).

It should be understood that this Announcement is primarily intended for oceanographic and meteorological investigations utilizing NSCAT data. NASA recognizes that, in some cases, other data will be required to fully exploit the scatterometer data. However, it is not the intent under this AO to support the acquisition of large quantities of in situ or other remotely sensed measurements. It is anticipated that other funding agencies (National Science Foundation, Office of Naval Research, and National Oceanic and Atmospheric Administration) will be developing and funding complementary investigations (see Section III). Prospective investigators wishing to acquire substantial quantities of non-NSCAT data will assume all responsibility for obtaining these data (see Section VI). However, proposals submitted in response to this Announcement may request support for the analysis of joint data sets composed of both NSCAT and complementary data.

III. BACKGROUND

The NSCAT/N-ROSS mission is one component of a broader NASA research program in oceanography and the study of air-sea interactions. NASA's first oceanographic instrument in space was a microwave sensor that flew aboard Skylab in 1972. Since that time, ocean-related sensors have flown aboard several satellites, including Seasat--the first dedicated oceanographic satellite--launched in 1978. The Seasat Scatterometer clearly demonstrated that spaceborne microwave scatterometers were capable of obtaining measurements of near-surface wind speed and direction over the global oceans. The technical and scientific

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successes of Seasat provided the foundation for the design of a coordinated ocean observation system aimed at further understanding of the oceans and their interactions with the atmosphere.

NASA has worked with the National Science Foundation, the U.S. Navy, the National Oceanic and Atmospheric Administration, and several international organizations to plan a series of satellite missions to observe the global oceans during the coming decade. Toward this end, an Interagency Agreement between NASA, Navy, NOAA, and NSF is currently being negotiated in order to provide a framework for coordination within the U.S. Government for the utilization of space observations from these missions for basic research in oceanography. The NSCAT/N-ROSS mission will be a key component in this series of satellite observations. In addition, the Ocean Topography Experiment (TOPEX) satellite altimeter mission is currently being considered by NASA for flight in mid-1990 as a joint venture with the French Centre National d'Etudes Spatiale (CNES). The objective of the TOPEX mission is to measure accurately the ocean surface topography, from which ocean surface currents can be estimated. By substantially overlapping in time the TOPEX and NSCAT missions, it may be possible to obtain simultaneous global measurements of ocean currents and their primary driving force, near-surface winds.

In addition to these satellite missions, the international research community, under the auspices of the World Climate Research Program (WCRP), is planning several large-scale experiments aimed at understanding the ocean's role in climate variability. Observational programs such as the World Ocean Circulation Experiment (WOCE) and the Tropical Oceans and Global Atmosphere (TOGA) experiment plan to acquire and analyze both in situ and remotely sensed data in the late 1980's and early 1990's. Global measurements by NSCAT of wind forcing and by TOPEX of ocean surface current response will potentially play a signficant role in these programs and will complement the important surface and subsurface data to be collected in situ by WOCE and TOGA investigators.

IV. NSCAT/N-ROSS DESCRIPTION

This section briefly outlines the overall N-ROSS mission and the capabilities of the NSCAT flight instrument and its associated ground data processing and distribution system. More detailed discussions are contained in the NSCAT Science Opportunities Document (SOD). Procedures for obtaining a copy of the SOD are given in Section VII.

A. N-ROSS Mission Description

N-ROSS is a satellite system focused on meeting Navy operational needs for near-real-time, accurate, high-resolution, and frequent measurements of near-surface wind, mesoscale ocean topography and wave

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height, sea-surface temperature, ice characteristics, and atmospheric water content over the global oceans. The design, implementation, launch, and operation of the N-ROSS mission will involve interagency cooperation among the U.S. Navy, NASA, the National Oceanic and Atmospheric Administration, and the U.S. Air Force. N-ROSS will have four microwave instruments mounted on a single satellite in a near-polar orbit:

a. a NASA scatterometer (described more fully in Section B);

b. a Special Sensor Microwave/Imager (SSM/I) to acquire data on scalar wind speed, atmospheric water content, and ice characteristics;

c. a low-frequency scanning microwave radiometer with a spatial resolution of 25 km that, used in concert with SSM/I information, will provide sea-surface temperatures;

d. a microwave altimeter to measure mesoscale ocean topography and significant wave height.

Present plans call for a launch in June 1989. N-ROSS will be placed in a sun-synchronous orbit at an altitude of approximately 830 km and an inclination of 98.7 degrees. The design mission duration is 36 months.

Data from the N-ROSS mission will be transmitted to the Fleet Numerical Oceanography Center (FNOC). NASA/JPL will obtain from the Navy all data necessary for processing NSCAT measurements, process all NSCAT data collected over the ocean, and provide research quality scatterometer data and limited SSM/I data to SWT investigators in a timely manner. The Navy plans to make operationally processed data from all N-ROSS sensors available to civil users through NOAA/NESDIS. Initially, the Navy may withhold some data when considered in the national interest.

B. NSCAT Measurement Capabilities

The NSCAT radar will operate at a frequency of 13.995 GHz. The baseline design of the NSCAT flight instrument calls for three antennas to illuminate each side of the subsatellite track, allowing measurements of ocean radar cross section using a mix of horizontally and vertically polarized beams.

1) Coverage and Resolution

Vector winds will be obtained in two swaths, each 600 km wide, separated by a gap of 350 km width centered on the subsatellite track. Vector wind measurements over at least 90% of the ice-free.

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global oceans will be obtained at least once in every two-day period. Measurements of ocean radar cross section will be obtained with a resolution of 25 km. These data will be processed, for SWT and other research users, to produce vector winds having 50 km resolution. The absolute location accuracy of the vector winds is expected to be better than 50 km (rms), and the relative location accuracy of any two adjacent vector wind measurements is expected to be better than 10 km (rms).

2) Speed and Direction Accuracies

Wind speed rms accuracy is expected to be better than 2 m/s for winds from 3-20 m/s and better than 10% for winds from 20-30 m/s. Although the relationship between ocean radar cross section and wind velocity is not well-established for wind speeds greater than 30 m/s, the system may be capable of measuring winds up to 100 m/s.

Significant ground data processing is necessary in order to calculate unique wind directions from NSCAT measurements of ocean radar cross section. Initial processing results in up to 6 possible directions associated with every speed measurement. Subsequent processing of the data eliminates four of the six possible directions. The remaining two possible solutions are generally nearly 180^{o} apart, and simulations indicate that one of these two possible directions is within 20^{o} (rms) of the true wind direction more than 90% of the time. The ground data processing system will then employ an objective algorithm to choose a single wind direction. It is estimated that this algorithm will make the correct choice more than 90% of the time.

It is well known that the presence of atmospheric liquid water degrades the accuracy of scatterometer measurements of ocean radar cross section and wind velocity. Over most of the NSCAT measurement swaths, data from the N-ROSS SSM/I will be used to infer atmospheric liquid water content. Cross section and wind velocity measurements from NSCAT in regions of high liquid water content will be flagged. Measurements for which there exist no usable SSM/I data will be identified by a separate flag.

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C. Data Processing and Distribution System

In addition to the NSCAT flight instrument, NASA/JPL will provide a research ground data processing and distribution system. The data processing system will operate at a real-time rate (although not in real time). This system will process the raw NSCAT data and produce several levels of scientifically useful geophysical wind products. As described above in Section B.2, raw data will be processed in stages to vector winds. The vector winds will then be combined, using spatial and temporal averaging, to produce wind field maps whose precise form will be defined in consultation with the SWT.

All raw data, as well as selected levels of processed data, will be archived by the NSCAT Project for the duration of the misssion. These same data will be made available by NASA to NOAA/NESDIS.

Several intermediate levels of processed NSCAT data, selected in situ data, as well as all ocean vector wind measurements and wind field maps, will be available to SWT investigators through an on-line NASA/JPL data distribution system. Data will be available through the on-line distribution system within three weeks of acquisition by the satellite. Requests by SWT investigators for data archived off-line will be processed by the NSCAT Project in a timely manner.

V. PROPOSAL OPPORTUNITY PERIOD

All proposals submitted in response to this Announcement are due at NASA by the close of business on May 15, 1985. NASA reserves the right to consider proposals received after this deadline if such an action is judged to be in the interest of the U.S. Government. A complete proposal schedule is given in Section IX.

VI. REQUIREMENTS AND CONSTRAINTS

As indicated earlier, NSCAT science investigations are scheduled to begin in FY 86 and to continue through FY 92, the end of the nominal NSCAT/N-ROSS mission. Current plans call for a minimum of 8 million dollars to be made available by NASA to support science investigations selected on the basis of this Announcement process.

Assuming that the proposed TOPEX mission is approved, NASA plans, at some future time, to form a team of science investigators to utilize both NSCAT and TOPEX altimeter data to develop and test models of ocean circulation (see Sections II and III). Through the present NSCAT Announcement, however, NASA is soliciting proposals for the utilization only of scatterometer data from

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NSCAT. Proposals submitted in response to this Announcement will be judged solely on the basis of their relevance to the NSCAT science objectives described in Section II.

Since the launch of N-ROSS is presently planned for mid-1989, cost and work plans should address both the planned Phase I pre-launch preparatory activit' s to be conducted in FY 86 through FY 88 and the Phase II ata analysis activities to be conducted in FY 89 and beyond. Throughout the entire investigation period, approximately three meetings per year of the SWT, in whole or in part, are planned.

The following guidelines are given for the development of cost and work plans submitted by a proposer.

- o During the Phase I pre-launch years FY 86-FY 87, activities will focus on:
  - Familiarizing SWT members with NSCAT Project plans and requirements;
  - Refining plans for individual science investigations and developing data analysis techniques that are consistent with the NSCAT Project data products.
  - Preparing the NSCAT Science Plan, a document summarizing individual and joint investigations to be conducted utilizing data from, and in association with, the NSCAT/N-ROSS mission;
  - Advising NASA and the NSCAT Project on the detailed planning and design of the NSCAT system (as described in Section I);
- o FY 88 and the first half of FY 89 will be transition years, during which emphasis will increasingly be placed on refinement of final technical plans for Phase II science investigations and the continued development of software/data analysis techniques.
- o For the Phase II post-launch period, proposals should contain detailed plans and budgets for anticipated data analysis activities. It is expected that the major costs associated with the implementation of investigations will be incurred in this period.

The technical progress and accomplishments of approved investigations selected through this Announcement will be monitored by the Jet Propulsion Laboratory. All selected Principal Investigators will be required to submit periodic progress reports to JPL describing the current status of their project and to prepare a final report at the end of the

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investigation period. Publication of results in the refereed scientific literature will be required during and upon completion of the investigation period. Investigators selected as a result of this Announcement are expected to make available to NASA all developed techniques, methods of analysis, and results over the course of their investigation (see Appendix A for details).

VII. PROPOSAL SUBMISSION INSTRUCTIONS

A. Letter of Intent to Propose

The Program Scientist for NSCAT at NASA Headquarters is Dr. William C. Patzert. Those interested in proposing an investigation as part of the NSCAT experiment should notify NASA of their intent to propose by sending a short Letter of Intent to:

Dr. William C. Patzert
NASA Scatterometer (Ref. AO-OSSA-1-85)
Code EE
National Aeronautics and Space Administration
Washington, DC 20546

When the institution sponsoring a proposal is from any country other than the U.S.A., the Letter of Intent should be sent to the above address with a copy to:

Ms. Lynn Cline
NASA Scatterometer (AO-OSSA-1-85)
International Affairs Division (Code LID)
National Aeronautics and Space Administration
Washington, DC 20546
U.S.A.

The brief Letters of Intent should include the following information:

Name, address, and telephone number of the Principal Investigator;

Name and address of sponsoring and/or funding organization; and

Specific objectives of the intended investigation.

Letters of Intent must be received at NASA Headquarters on or before March 15, 1985. Material in these letters is for information only and is not binding on the signatories. Additional information can be obtained from Dr. William C. Patzert, at the above address or telephone number (202) 453-1730. All individuals submitting a Letter of Intent will receive a copy of the NSCAT Science Opportunities Document, which provides detailed information on the measurement of wind speed and direction over the oceans by

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scatterometry. It also presents a survey of possible oceanographic, meteorological, and sensor studies utilizing NSCAT data.

B. Proposal Preparation Procedures

A uniform proposal format will be required to aid in proposal evaluation and to facilitate comparative analysis. Detailed instructions concerning the scope and organization of NSCAT scientific proposals are presented in Appendix B of this Announcement. All proposals should contain a technical plan describing the technical aspects of the investigation and a management/cost plan describing how the project will be implemented. The proposal technical plan will be restricted in length to no more than 15 pages of single-spaced text. All proposals must be submitted in English. Foreign proposals must be accompanied by a letter of endorsement from a foreign sponsoring agency (see Appendix B).

Technical data of a proprietary nature contained in any proposal will be used by NASA for evaluation purposes only. Special procedures described in Appendix A of this Announcement should be used to specify those sections of a proposal that constitute a trade secret under law. It is NASA's policy to protect proprietary data and information from public disclosure.

C. Proposal Submission

Fifteen copies of each proposal should be submitted to NASA. Five of these copies should include the management/cost plan and the remaining ten should consist of the technical plan alone. At least one complete copy of the proposal must be signed by an institutional official authorized to certify institutional support, sponsorship of the investigation, and the management and financial aspects of the proposed project. Proposals originating from within the United States should be sent to:

National Aeronautics and Space Administration
Office of Space Science and Applications
Attn: Code EE (AO No. OSSA-1-85)
Washington, DC 20546

Foreign proposals should be mailed to:

National Aeronautics and Space Administration
International Affairs Division
Attn: Code LID (AO No. OSSA-1-85)
Washington, DC 20546
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VIII. PROPOSAL EVALUATION, SELECTION, AND IMPLEMENTATION

A. Evaluation and Selection Procedures

All proposals received in response to this Announcement will be initially screened by the NSCAT Program Scientist and the NSCAT Project Scientist to determine their general relevance to the objectives stated in Section II. Those proposals considered to be unresponsive to the stated objectives of this Announcement will be returned to their authors immediately with a written explanation of this determination. Such proposals will not be considered further by NASA. Those proposals considered to be responsive to the Announcement objectives will subsequently be reviewed by a technical panel composed of individuals with widely recognized expertise in remote sensing and oceanographic/meteorological research. The purpose of this review is to evaluate the scientific merit and technical feasibility of the proposed investigation. Those proposals considered to be meritorious and feasible in principle will be further reviewed by the NSCAT experiment team at JPL to determine their technical feasibility and overall compatibility with the NSCAT mission plan. An ad hoc subcommittee of the Space Science and Applications Steering Committee (SSASC) will categorize the proposals on the basis of these reviews in accordance with NASA Handbook NHB 8030.6A. Proposals which do not request NASA funds for data analysis activities will be subjected to the same review and evaluation procedures as those proposals requiring financial support.

The procedures, documentation, and results of the proposal evaluation process will be reviewed by the full SSASC. Final decisions concerning the acceptance of individual proposals will be made by the Associate Administrator for Space Science and Applications based upon the recommendations of the SSASC. These decisions will take into consideration the relevance of proposed investigations to ongoing NASA programs, the overall balance between different scientific disciplines, and the availability of funds and mission-related resources.

B. Evaluation Criteria

The fundamental goal of the investigation acquisition process is to identify unique ideas and capabilities which best suit the overall scientific and

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technological objectives of NASA. The following criteria, listed in descending order of importance, will be used in evaluating individual proposals:

1. The relevance of the proposed investigation to the NSCAT specific opportunity and to the established experiment objectives cited in Section II.

2. The scientific and technological merit of the investigation, including the topical importance of the proposed study within a specific disciplinary field and the probability of achieving positive results.

3. The competence and relevant experience of the Principal Investigator and any collaborators as an indication of not only their ability to carry the investigation to a successful conclusion, but also their ability to contribute to the pre-launch mission planning activities.

4. The reputation and interest of the investigator's institution, as measured by the willingness of the institution to provide the necessary support to ensure that the investigation can be completed satisfactorily.

In the event that ancillary data is crucial to the success of the proposed investigation, the proposal must clearly indicate the adequacy and practicality of any plan to acquire these data. In addition to the criteria listed above, cost and management factors will be separately considered in all selections. Management aspects include the time and attention the Principal Investigator plans to devote personally to the investigation (see Section VI). NASA may desire to select only a portion of a proposer's investigation, in which case the investigator will be given the opportunity to accept or decline such partial acceptance.

C. Implementation

Individuals responding to this Announcement will be notified of the outcome of the proposal selection process by NASA Headquarters. It is currently expected that official notifications of acceptance or rejection will be issued in November 1985. Selected NASA investigators will subsequently be contacted by a representative of the Jet Propulsion Laboratory who will be authorized to award the contract and discuss the specific terms under which the investigation will be implemented.

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IX. Schedule

Letter of Intent to propose due not later than	March 15, 1985
Proposals due at NASA Headquarters by 4:30 p.m. EDT	May 15, 1985
Announcement of Selections	November 15, 1985

The NASA scatterometer planned to fly aboard the N-ROSS satellite will be one of NASA's major ocean observation flight projects during the late-1980s and early-1990s. The NSCAT experiment to be conducted during this mission will provide new information needed to advance our understanding of the ocean's response to surface wind forcing and physical processes governing atmospheric motions in the troposphere. NSCAT scientific investigations will play a key role in furthering our knowledge of the global oceans and their role in climate variability. NASA is pleased to sponsor this spaceborne mission and views it as a major contribution to the WCRP experiments, WOCE and TOGA. I invite you to take part in this important and exciting experiment in oceanography and meteorology.

B. I. Edelson

B. I. Edelson
Associate Administrator for
Space Science and Applications

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APPENDIX A

NASA GENERAL INSTRUCTIONS AND PROVISIONS

I. Instrumentation and/or Ground Equipment

By submitting a proposal, the investigator and his institution agree that NASA has the option to accept all or part of the proposer's plan to provide the instrumentation or ground support equipment required for the investigation. NASA may furnish or obtain such instrumentation or equipment from any other source as determined by the selecting official. NASA reserves the right to require use of Government instrumentation or property to meet the investigative objectives if it is the Government's interests to do so.

II. Tentative Selections, Phased Development, Partial Selections, and Participation with Others

By submitting a proposal, the investigator and his institution agree that NASA has the option to make a tentative selection pending a successful feasibility or definition study of the proposed investigation. Furthermore, NASA has the option to contract in phases for implementation of a proposed investigation, and to discontinue the development of an investigative effort at the completion of any phase. The investigator should also understand that NASA may desire to select only a portion of the proposed investigation. In cases in which two or more proposals address similar topical problems and/or adopt similar approaches to NSCAT data analysis, NASA may desire joint participation on the part of two or more proposers in a single data analysis project. Where joint participation with other investigators is agreed to, a single individual will be designated as the leader or contact point for the investigator group.

III. Selection Without Discussion or After Limited Discussion

The U.S. Government reserves the right to reject any or all proposals received in response to this Announcement when such action shall be considered in the best interest of the Government. Notice is also given of the possibility that any selection may be made without discussion or after limited discussion. It is, therefore, emphasized that all proposals should be submitted initially on the most favorable terms that the offerer can submit.

IV. Foreign Proposals

Proposals for participation by individuals outside the U.S. should be submitted in the same format (excluding cost plans) as U.S. proposals. They must be typewritten and in English.

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Foreign proposers must have their proposal reviewed and endorsed by an appropriate foreign governmental agency. Endorsed proposals should be forwarded to NASA to arrive before the deadline indicated under Section IX of the Announcement.

"Letter of Intent" to propose should be sent directly to the office designated in the Announcement with a copy sent to NASA's International Affairs Division. All other correspondence (including proposals and endorsements) from foreign proposers and organizations should be sent to:

National Aeronautics and Space Administration
International Affairs Division
Code LID (A.O. No. OSSA-1-85)
Washington, DC 20546
U.S.A.

Foreign proposals will be subject to the same evaluation and selection process applied to proposals originating within the U.S. Should a foreign proposal be selected, NASA will arrange with the sponsoring foreign agency for the proposed participation on a no-exchange-of-funds basis, in which NASA and the sponsoring agency will each bear the cost of discharging its respective responsibilities including travel and subsistence for its own personnel.

V. Treatment of Proposal Data

The following will apply in the treatment of proposal data received in response to this Announcement.

A. Commercial and Financial Data

1. It is NASA's policy to use commercial and financial data included in proposals for evaluation purposes only. This policy does not require that this kind of proposal data bear the "Notice" described below.

2. Where it is the practice of a proposer or his proposed subcontractor to treat certain commercial and financial data as a trade secret, and such data is protectible as a trade secret under law, he may apply the "Notice" of paragraph (B) below to those portions to be maintained as a trade secret.

3. In any event, commercial and financial data submitted to NASA in a proposal will be protected to the extent permitted under the law, either as a

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properly noticed trade secret, or as commercial or financial information received from a person and considered confidential or privileged.

B. Technical Data

It is NASA's policy to use the technical data contained in any proposal submitted in response to this Announcement for evaluation purposes only. Where any such technical data constitutes a trade secret under the law, and the proposer or his potential subcontractor desires to maintain trade secret rights in such technical data, the following "Notice" must be affixed to the cover sheet of the proposal specifying the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the "Notice." It is NASA policy to protect technical data labelled in this fashion as a trade secret. NASA assumes no liability for use or disclosure of any proposal technical data to which the "Notice" has not been applied.

NOTICE

Data on page(s) ..... of this proposal constitute a trade secret. It is furnished to the government in confidence with the understanding that it will not, without permission of the proposer, be used or disclosed other than for evaluation purposes. In the event a contract is awarded on this proposal the Government may obtain, in the contract, additional rights to use and disclose this data.

VI. Status of Cost Proposals (U.S. Proposals Only)

The investigator's institution agrees that the cost proposal submitted in response to the Announcement is for proposal evaluation and selection purposes and that, following selection and during negotiations leading to a definitive contract, the institution will be required to resubmit or execute a DD Form 633 (Contract Pricing Proposal) as well as submitting all certifications and representations required by law and regulation.

VII. Late Proposals

NASA reserves the right to consider proposals or proposal modifications received after the submission deadline but prior to the date of selection should such an action be in the interest of the U.S. Government.

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VIII. Disclosure of Proposals Outside the U.S. Government

NASA may wish to obtain assistance outside the U.S. Government in evaluating the technical or scientific aspects of individual proposals. Special arrangements will be established for the appropriate handling of proposal information by outside reviewers. If the investigator or his institution wish to preclude NASA from employing outside reviewers, the investigator or his institution should so indicate in a covering letter accompanying the proposal. By submitting a proposal without such a letter, the investigator and his institution implicitly agree that NASA may have the proposal reviewed by outside specialists who possess recognized expertise in radar remote sensing and oceanographic applications research. If a proposer objects to the use of outside experts for purposes of proposal evaluation, NASA may be unable to consider the proposed investigation for inclusion in the NSCAT experiment.

IX. Equal Opportunity (U.S. Proposals Only)

By submitting a proposal, the investigator and his institution agree to accept the below clause in any resulting contract:

EQUAL OPPORTUNITY (JUNE 1973)

During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include but not be limited to the following: employment, upgrading, demotion, transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified

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applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(3) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency Contracting Officer, advising the labor union or workers' representative of the Contractor's commitments under this nondiscrimination clause and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and by the rules, regulations, and orders of the Secretary of Labor or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the Contractor's noncompliance with the Equal Opportunity clause of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended, in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The Contractor will include the provisions of Paragraph (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order

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11246 of September 24, 1965, as amended by Executive Order 11375 of October 13, 1967, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

X. Invention and Data Rights

The following provisions concerning invention and data rights will be applicable to any contract resulting from a selection under this Announcement:

(1) In instances where NASA totally or partially funds an investigation under a NASA contract, NASA is required by law to take title to inventions which may result from the work performed under the contract. The contractor would be granted a royalty-free license to practice the invention. The contractor, however, could petition for waiver of such title in accordance with NASA Patent Waiver Regulations 14 C.F.R. 1245.1, whereupon the Agency would give favorable consideration towards waiving title to the invention to the contractor subject to the reservation by the Government of a royalty-free license. As a general rule, the contract provides that NASA and the contractor can use and disclose, without restrictions, the data generated under the contract.

(2) In instances where a joint project is undertaken, i.e., the investigator furnishes the investigation without charge to NASA and no transfer of funds takes place, NASA will obtain a royalty-free license to practice for U.S. Governmental purposes any inventions resulting from the investigation, together with the right to use and disclose the resulting data for U.S. Governmental purposes.

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APPENDIX B

GUIDELINES FOR PROPOSAL PREPARATION

The following guidelines apply to the preparation of proposals in response to this Announcement. The proposal format outlined below is merely a guide for the prospective proposer. Strict adherence to most of these guidelines is not absolutely necessary. However, page limits will be strictly enforced and proposals should provide information related to all items described below and as otherwise specified in this Announcement.

1. COVER LETTER

   A letter or cover page should be forwarded with the proposal. It should be signed by the investigator and an official of the investigator's organization who is authorized to commit the organization to the contents and the implementation of the proposal.

2. TABLE OF CONTENTS

   The proposal should contain a table of contents.

3. IDENTIFYING INFORMATION

   The proposal should contain a short descriptive title for the investigation, the names of all investigators, the name of the organization or institution, the full name of the principal investigator, his address with zip code, and his telephone number.

SECTION I--INVESTIGATION AND TECHNICAL PLAN

1. INVESTIGATION AND TECHNICAL PLAN

   The investigation and technical plan generally will contain the following:

   a. Summary. A simple, concise statement about the investigation, its conduct, and the anticipated results. This summary should not exceed two single-spaced, typewritten pages.

   b. Experimental Objectives. A brief description of the technical objectives and their relationship to past research efforts and the current state-of-the-art. The scientific rationale for the proposed investigation should be clearly established through references to existing scientific literature and other publications. The proposed investigation should be defined in relation to the current state-of-the-art in scatterometry remote sensing and/or important

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scientific problems in oceanography and/or meteorology. Proposers are encouraged to define explicit hypotheses that will be tested and/or evaluated by the proposed project.

c. Approach. The concept of the investigation should be clearly stated, and the methods to be employed in data analysis and interpretation should be presented. In the case of NSCAT the data analysis approach adopted in an investigation can generally be classified into one or more of the following categories: (i) the application of proven techniques for analyzing space-acquired data to a new problem or geographical setting, (ii) the extrapolation of conventional methods that have traditionally been employed in data analysis to space-acquired scatterometer data, and (iii) the development of new procedures for data reduction and analysis. Proposers should attempt to characterize their intentions with regard to data analysis in relation to these categories.

d. Experimental Plan. The overall methodology of the investigation should be presented in some detail. The proposal should specifically identify the total amount of NSCAT data required by the investigation, the form in which it is to be delivered to the principal investigator, and the desired timetable for data acquisition and delivery. Ancillary types of data to be employed in the analysis and interpretation of NSCAT data should be clearly identified. Sources of ancillary data should be described along with the procedures that will be used to obtain and reduce ancillary data sets. There should be a clear and logical connection between the data that will be employed by the investigation, the information that will be extracted or inferred from this data, and the manner in which such information will be used in addressing the stated objectives of the investigation. The chronological sequence of data collection, analysis, and interpretation activities envisioned by the investigation should be explicitly described. This sequence of events will be carefully evaluated to ensure that the study can be successfully completed during the proposed lifetime of the investigation. In cases where detailed studies of particular regional areas will be conducted, the proposal should explicitly define the factors that were considered in regional selection.

e. Anticipated Results. To the extent that it is feasible, the expected outcome of the proposed project should be presented. The significance of these results

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should be discussed, if possible, in terms of their scientific significance and implications for future research and development.

f. Significance of the Investigation. The significance of the proposed study should be defined in terms of its relationship to earlier studies of a similar nature and/or the implications of the anticipated results. The proposal should attempt to characterize the relative degree of innovation associated with the objectives or approach of the proposed study. In addition, the proposal should attempt to characterize the importance of the anticipated results in relation to the current state of knowledge within particular disciplinary fields. The extent to which the anticipated results will influence the definition and conduct of future research projects on similar or related topics should be discussed in the proposal.

The technical plan should not exceed 15 single-spaced pages of printed text, excluding illustrations, tables, references, bibliographies, and biographical information. Information concerning the education, training, and relevant experience of the investigators involved in the proposed study should be provided on separate sheets attached to the technical plan. Biographical information of this nature should be limited to two pages or less for each investigator who will play a substantial role in the investigation. Proposers who wish to provide evidence of their experience and knowledgeability in particular disciplinary fields are encouraged to cite relevant publications they have authored in the general scientific literature. References to earlier publications should be limited to major publications that are directly relevant to the proposed investigation. These citations should be included within the two pages allotted to each investigator for biographical information. Proposers should not include lengthy publication bibliographies or copies of specific publications in their proposal.

Information concerning specialized equipment or facilities that will be used during the course of the investigation should not be presented in the technical plan. Information of this nature should be included in the management and cost plans described below.

It is anticipated that a large number of proposals will be received by NASA in response to this Announcement. To expedite the proposal evaluation process and assure fairness to all proposers, the length restrictions described above will be strictly enforced. If a prospective investigator fails to observe the restrictions on proposal length cited above, NASA reserves the right to return the proposal to the proposer upon receipt without further review or evaluation.

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SECTION II--MANAGEMENT PLAN AND COST PLAN

The management and cost plans should be prepared in a combined fashion and reproduced as a physically separate document that can accompany the investigation and technical plans described above. The investigation/technical plans and the management/cost plans will be reviewed independently during the various stages of the proposal evaluation process described in Section VIII of the Announcement.

A. MANAGEMENT PLAN

The management plan should summarize the management approach and the facilities and equipment required. Additional guidelines applicable to non-U.S. proposers are contained herein:

1. MANAGEMENT

   a. The management plan sets forth the investigator's approach for efficiently managing the work, the recognition of essential management functions, and the effective overall integration of these functions. If ancillary data is needed, the method for obtaining these data should be detailed.

   b. The management plan gives insight into the organization proposed for the work, including the internal operations and lines of authority with delegations, together with internal interfaces and relationships with NASA, major subcontractors, and associated investigators. Likewise the management plan usually reflects various schedules necessary for the logical and timely pursuit of the work, accompanied by a description of the Principal Investigator's work plan and the responsibilities of the scientific collaborators (if any).

   c. The planned participation by small/disadvantaged business in any subcontracting for investigative support functions should be indicated.

2. FACILITIES AND EQUIPMENT

   All major facilities and equipment essential to the proposed investigation should be indicated, including those of the investigator's proposed subcontractors and those of NASA and other U.S. Government agencies (or foreign agencies, in the case of non-US proposals). Existing equipment should be explicitly differentiated from facilities that will be developed to implement the investigation. Procurement schedules and lead times for the acquisition and installation of new equipment and facilities should also be

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indicated. Since these investigations will focus on NSCAT data analysis, the development of new equipment and facilities will be limited only to the support required for these analyses.

3. ADDITIONAL GUIDELINES APPLICABLE TO NON-U.S. PROPOSERS ONLY

The following guidelines are established for foreign responses to NASA's Announcements of Opportunity. These guidelines indicate the appropriate measures to be taken by foreign proposers, prospective foreign sponsoring agencies, and NASA leading to the selection of a proposal and execution of appropriate arrangements. They include the following:

a. With respect to the "Letter of Intent" to propose, prospective foreign proposers should write directly to the NASA official designated in the Announcement and send a copy of this notice to the International Affairs Division, Code LID, National Aeronautics and Space Administration, Washington, DC 20546, U.S.A.

b. Proposals will be submitted in accordance with these NASA "Guidelines for Proposal Preparation." Proposals must be typewritten and in English.

c. Persons planning to submit a proposal should arrange with an appropriate foreign governmental agency for a review and endorsement of the proposed activity. Such endorsement by a foreign organization indicates:

   1) The proposal merits careful consideration by NASA.

   2) If the proposal is selected, sufficient funds will be available to undertake the activity envisioned.

d. Proposals (along with the requested number of copies) and letters of endorsement from the foreign governmental agency should be forwarded to NASA in time to arrive before the deadline established for this Announcement of Opportunity. These documents should be sent to:

   International Affairs Division
   Code LID (AO No. OSSA-1-85)
   National Aeronautics and Space Administration
   Washington, DC 20546
   U.S.A.

e. All proposals should be received before the established closing date; those received after the closing date will be treated in accordance with NASA's provisions for late proposals. Sponsoring agencies may, in

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exceptional situations, forward a proposal directly to the above address if review and endorsement can be expected.

f. Shortly after the deadline for this Announcement of Opportunity, NASA's International Affairs Division will advise the appropriate sponsoring agency which proposals have been received and when the selection process should be completed. A copy of this acknowledgement will be provided to each proposer.

g. Successful and unsuccessful proposers will be contacted directly by the NASA Program Office coordinating this Announcement of Opportunity. Copies of these letters will be sent to the sponsoring governmental agency.

h. NASA's International Affairs Division will then begin making the necessary arrangements to provide for the selectee's participation in the program. Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

1) A letter of notification by NASA.

2) An exchange of letters between NASA and the sponsoring foreign governmental agency.

3) An agreement or Memorandum of Understanding between NASA and the sponsoring foreign governmental agency.

B. COST PLAN (U.S. Investigations Only)

The cost plan should summarize the total investigation cost by major categories of cost as well as by function.

1. COST CATEGORIES

The categories of cost should include the following:

a. Direct Labor. List by labor category, with man-hours and rates for each. Provide actual salaries of all personnel and the percentage of time each individual will devote to the effort.

b. Overhead. Include indirect costs which, because of their incurrence for common or joint objectives, are not readily subject to treatment as a direct cost. Usually, this is in the form of a percentage of the direct labor costs.

c. Materials. This should give the total cost of the bill of materials including estimated cost of each major item. Include lead time of critical items.

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d. Subcontracts. List those over $10,000; specify the vendor and the basis for estimated costs. Include any baseline or supporting studies.

e. Special Equipment. Include a list of special equipment and lead and/or development time.

f. Travel. List estimated number of trips, destinations, duration, purpose, number of travelers, and anticipated dates.

g. Other Costs. Cost not covered elsewhere.

h. General and Administrative Expense. This includes the expenses of the institution's general and executive offices and other miscellaneous expenses related to the overall business.

i. Fee (if applicable).

2. COST SCHEDULE

Separate schedules for each fiscal year, in the above format, should be attached to show total cost allocable to the following:

a. Principal investigator and scientific collaborator costs.

b. Data reduction and analysis including the amount and cost of computer time.

c. Cost of correlative data (if any) to be acquired by the investigator.

d. Cost of field studies in excess of $10,000 to support NSCAT data analysis and interpretation.

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APPENDIX C

NSCAT SCIENTIFIC MANAGEMENT, ORGANIZATION, AND RESPONSIBILITIES

I. Introduction

The purpose of this Appendix is to describe the management approach for the science activities associated with the NSCAT project and the authority, responsibilities, and interfaces of key participants in the project.

II. Project Organization

The Jet Propulsion Laboratory (JPL) has been designated by the Office of Space Science and Applications (OSSA) in NASA Headquarters as the Project Management Center for the NSCAT. Within OSSA, the project will be directed by the Earth Science and Applications Division. Figure C-1 illustrates the organization of the NSCAT Project at JPL.

III. Science Management

1. Program Scientist

The designated Program Scientist in the Oceanic Processes Branch at NASA Headquarters is responsible for defining the NSCAT Program science objectives and the primary mission requirements required to meet those objectives. After selection of the SWT, the Program Scientist will be responsible for OSSA Program Office management of the scientific aspects of the experiments and provide policy and procedural guidance to the Project Scientist. In conjunction with the Project Scientist, the Program Scientist will monitor the status of development, progress, and operation of each investigation of the mission. For the duration of the Program, the Program Scientist coordinates other NASA science activities associated with NSCAT and assures that they conform to the overall objectives of OSSA and the Earth Science Applications Division.

2. Project Scientist (PS)

The PS is responsible for maximizing the scientific return from the NSCAT within the Project constraints. The PS will chair the Science Working Team (SWT) and will be the primary point of contact between the science investigators chosen through the AO process and the Project on matters of scientific interest on a daily basis. The PS will be responsible for coordinating the pre- and post-launch science investigations, planning and conducting NSCAT

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validation activities, and coordinating the data reduction and dissemination conducted by the Project. The PS is the principal science advisor to the Project Manager and will be responsible for reviewing the implementation of the Project to ensure that the overall mission approach is consistent with the science objectives.

3. Principal Investigators (PI)

A PI has full responsibility for the conduct of the selected investigation including the cost, development, and implementation of pre- and post-launch analyses. The PI will direct and coordinate the acquisition of any ancillary data necessary for the investigation, the analysis of all pertinent data, and the publication of the scientific results.

Other specific activities of the PI include:

a. Allocating work assignments among and managing the activities of his/her Co-Investigators.

b. Ensuring that the design of the investigation is appropriate to the objectives and capabilities of the NSCAT instrument.

c. Developing and maintaining adequate documentation regarding the investigation, including preparing periodic progress summaries for the PS.

d. Planning, conducting, and coordinating (with the NSCAT Project) verification activities, over and above those conducted by the NSCAT Project.

e. Identifying, planning, and conducting (in association with the PS and other PI's) pre-launch science activities to assist the Project in detailed planning and design of the NSCAT system (see Section I of the AO).

f. Representing the interests of the Co-Investigators at all meetings of the Science Working Team.

III. NSCAT Science Working Team

As described in the Announcement in Section I, an NSCAT Science Working Team (SWT) will be formed. This SWT will be composed of the PI's of all selected investigations, the PS, the NASA Headquarters Program Scientist, and a representative of the Navy N-ROSS Project. The SWT will be chaired by the Project Scientist. The chairman will serve as the SWT's representative in activities not requiring participation by all Team members. The SWT will:

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1. Assist the NSCAT Project in the detailed planning and design of the NSCAT system, addressing issues and topics such as those presented above in Section I of the AO.

2. Assist the NSCAT Project in the definition of Project/science interfaces.

3. Participate in selected NSCAT Project reviews to coordinate science requirements and to assist the NSCAT Project in mission decisions as they relate to the science objectives and investigations.

4. Jointly discuss and coordinate among all members data analysis techniques, methods, and the scientific results of investigations relating to NSCAT.

5. Represent NSCAT interests in related international programs such as the World Ocean Circulation Experiment and the Tropical Ocean/Global Atmosphere program.

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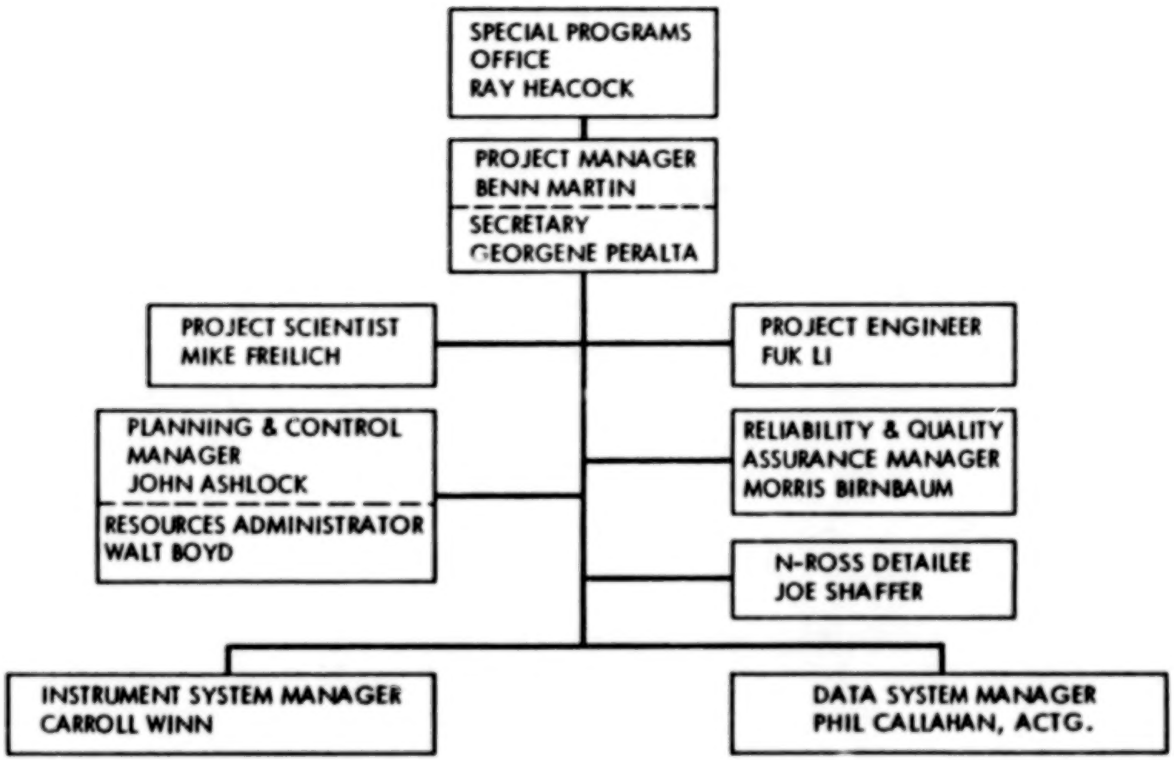
Figure C-1

NSCAT
PROJECT ORGANIZATION



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